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GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

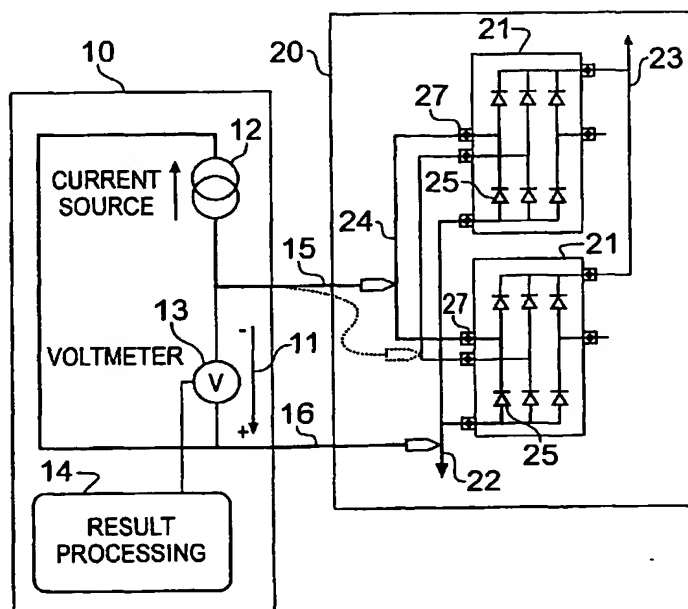
— as to the applicant's entitlement to claim the priority of the  
earlier application (Rule 4.17(iii)) for all designations

**Published:**

— with international search report  
— before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

[Continued on next page]

(54) Title: A METHOD OF AND APPARATUS FOR TESTING FOR INTEGRATED CIRCUIT CONTACT DEFECTS



(57) Abstract: Various tester configurations are provided that injects test signals into nets (e.g. 24). Non-linear characteristics of the response are detected (e.g. harmonics, dc offset) and used to assess the adequacy or otherwise of device connections in the net.



**(88) Date of publication of the international search report:**  
23 December 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/04640

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G01R31/04 G01R27/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, IBM-TDB

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 365 180 A (EDELMAN RAN) 15 November 1994 (1994-11-15)	1, 4, 5, 10-15, 18, 19, 22, 23, 28-32, 35-37
Y	column 1, line 15 - line 20	6-9, 16, 17, 24-27, 34
A	column 2, line 5 - line 27 column 3, line 4 - line 14 column 3, line 24 - line 57 figure 1 claim 1	2, 3, 20, 21, 33
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

21 October 2004

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# INTERNATIONAL SEARCH REPORT

national Application No

JT/GB 03/04640

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 0 622 733 A (SGS THOMSON MICROELECTRONICS)  2 November 1994 (1994-11-02)  abstract  column 2, line 15 - line 18  column 4, line 1 - line 17  claims 1,5,14  figure 5</p>	10,28
A	<p>US 5 786 700 A (JEN KEH-CHEE ET AL)  28 July 1998 (1998-07-28)  abstract  figures 2,3</p>	10,28
Y	<p>ROBINSON C ED - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "ANALOG AC HARMONIC METHOD FOR DETECTING SOLDER OPENS"  PROCEEDINGS OF THE INTERNATIONAL TEST CONFERENCE. ITC '97. WASHINGTON, DC, NOV. 1 - 6, 1997, INTERNATIONAL TEST CONFERENCE, NEW YORK, NY : IEEE, US, vol. CONF. 28,  1 November 1997 (1997-11-01), pages 125-126, XP000800318  ISBN: 0-7803-4210-0  page 125, column 1, paragraph 1 - column 2, paragraph 2</p>	6-9,16, 17, 24-27,34
A	<p>MINOWA I ET AL: "Nonlinear distortion voltage testing of contact surfaces"  CONFERENCE PROCEEDINGS ARTICLE,  26 September 1988 (1988-09-26), pages 277-280, XP010077325  page 277, column 1, paragraph 1</p>	6

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 03/04640

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/ GB 03 /04640

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,10-15,18-23,28-33,35-37

Method of testing the integrity of connections including non-linear elements on the basis of an offset voltage of the dynamic resistance in the non-linear circuit.

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2. claims: 6-9,16,17,24-27,34

AC harmonic analysis for detecting non-linear components on a net.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5365180	A	15-11-1994	NONE	
EP 0622733	A	02-11-1994	EP 0622733 A1	02-11-1994
			DE 69312263 D1	21-08-1997
			DE 69312263 T2	30-10-1997
			JP 7146327 A	06-06-1995
			US 5521511 A	28-05-1996
US 5786700	A	28-07-1998	NONE	